



NOTES RHABDOVIRUSES

MICROBE OVERVIEW

- Diseases
 - Rabies encephalitis, vesicular diseases

Genetic material

- Rod-shaped, single-stranded RNA virus

Taxonomy

- Order: *Mononegavirales*
- Family: *Rhabdoviridae*

- Genera: *Lyssavirus*, *Vesiculovirus*, *Sigmavirus*, *Varicosavirus*, *Spirivivirus*, etc.

Morphology

- Enveloped, bullet-shaped, with helical nucleocapsids, linear genomes

Transmission

- Via bite (infected host's saliva)

RABIES VIRUS

osms.it/rabies-virus

PATHOLOGY & CAUSES

- Serious **central nervous system (CNS)** viral zoonotic infection
- Virus spreads via nerves (**retrograde axoplasmic transport**)
- Muscle tissue inoculation → incubation (1–3 months), local multiplication → **acetylcholine receptor binding** → nerve entry → travel via spinal cord axons → brain infection (found in **cerebellum Purkinje cells**, hippocampal neurons) → encephalitis

Advanced-stage

- CNS → other organs (salivary glands, cornea, skin, gastrointestinal, etc.) via parasympathetic nervous system

CAUSES

- Caused by genus *Lyssavirus* (multiple species, *Rhabdoviridae* family)

Transmission

- Saliva in **virus-infected host** bite (dogs, bats, cats, raccoon, foxes, skunks, monkeys, etc.)
- Rabies-infected organ/tissue transplantation (rare)
- **Aerosol transmission** (e.g. bat caves) possible

RISK FACTORS

- Animal exposure (bite risk)
- Travel (rabies-endemic Asian/African areas)
- Age < 15 years
- Deep bite
- Head wound (virus → brain transmission risk ↑)
- No post-exposure prophylaxis
- Occupational (laboratory, veterinarian)
- Recreational (spelunking → ↑ bat exposure risk)

VISIT...

LANZAROTE
Caliente.COM

COMPLICATIONS

- Encephalopathy
- Increased intracranial pressure
- Coma
- Permanent neurological deficits
- Often fatal

SIGNS & SYMPTOMS

Prodromal stage

- Non-specific symptoms (first week)
 - Headache; low grade fever, chills; myalgia, weakness, fatigue; malaise, anorexia; nausea/vomiting; sore throat; photophobia (sometimes)
- Wound site pain/tenderness/paresthesia/tingling/itching

Encephalitic rabies

- AKA furious rabies
- Most common form
- Involuntary pharyngeal spasms → hydrophobia (fear of water); aerophobia
- Fever
- Muscle spasms → opisthotonus position
- Seizure
- ↑ autonomic stimulation
 - Excess salivation; lacrimation; sweating; mydriasis; impaired temperature homeostasis; tachycardia
- Dysphagia
- Aggressiveness, agitation, hallucination, confusion
- Respiratory distress → coma → respiratory arrest → death

Paralytic stage

- AKA dumb rabies
- Ascending flaccid paralysis
- Sphincter atony
- Hydrophobia (rare)
- Neck stiffness
- Cranial nerves palsy
- Fasciculations/deep tendon reflex loss
- Pharyngeal, diaphragm muscle paralysis → death

DIAGNOSIS

- Clinical Presentation
 - History of rabid animal bite, rabies infection symptoms/signs

DIAGNOSTIC IMAGING

CT scan

- Cerebral edema

LAB RESULTS

Reverse transcription PCR (RT-PCR)

- Saliva
 - Detects rabies virus RNA

Skin punch biopsy

- RT-PCR; immunofluorescence staining for viral antigen

Cerebrospinal fluid (CSF)

- Indirect immunofluorescence, virus neutralization assay
- CSF analysis
 - Pleocytosis, ↑ protein

Serum

- Anti-rabies virus antibodies in serum appear after first week (if individual not immunized)

OTHER DIAGNOSTICS

Post mortem

- Brain tissue/other neural tissue examination
 - Negri bodies, eosinophilic cytoplasmic inclusions in nerve cell cytoplasm (often)

TREATMENT

MEDICATIONS

- Antivirals
- Rabies vaccine
 - Both post-, pre-exposure prophylaxis
 - Immunocompetent people: four injections (day 0, 3, 7, 14)
 - Immunocompromised people: fifth injection (day 28)

- Previously immunized people: two injections (day 0, 3)
- Human rabies immune globulin (HRIG)
 - Single dose (20 units/kg) injected in, around wound
 - Remainder administered intramuscular at distant site (e.g. other deltoid)

OTHER INTERVENTIONS

Post-exposure prophylaxis (rapid)

- Wound cleaning
 - Water/soap, povidone iodine
- Antibiotics/tetanus prophylaxis

Management

- Respiratory (supplemental oxygen, mechanical ventilation), cardiovascular support (fluids)

Prevention

- Exposed population may receive pre-exposure prophylaxis
- Domestic animal vaccination (especially dogs, cats)



Figure 94.1 Multiple Negri bodies in the brain of an individual infected with the rabies virus. The negri bodies form in the Purkinje cells of the cerebellum.